Field Manual
No. 90-13

*FM 90-13

HEADQUARTERS
DEPARTMENT OF THE ARMY
Washington, DC, 1 November 1978

RIVER CROSSING OPERATIONS

This manual provides tactics and techniques for river crossing operations in the **offense and retrograde.** The doctrine and techniques apply primarily to deliberate crossings—that is, when the crossing force or its assault element must have considerable support from higher echelons to overcome the obstacle. The manual concentrates operations on division-level, yet the principles are applicable to higher and lower levels of command. Emphasis is placed on conventional warfare with limited discussions of nuclear, chemical, and biological considerations.

Throughout this manual the word "he" is intended to include both the masculine and the feminine genders. Exceptions have been noted.

Readers are encouraged to submit *substantive* comments and recommended changes on DA Form 2028 to:

COMMANDER
US ARMY COMBINED ARMS CENTER
ATTN: ATCA-DL
FT LEAVENWORTH, KS 66027

*This publication supersedes FM 31-60, 27 March 1972.

DELIBERATE RIVER CROSSINGS are characterized by:

- The failure or infeasibility of a hasty river crossing.
- Detailed planning and centralized control.
- A deliberate pause to prepare, acquire additional bridging/rafting equipment, and concentrate combat power.
- Clearance of enemy forces from the entry bank.

• **A deliberate river crossing** is required when a hasty crossing is not feasible, has failed, or when offensive operations must be renewed at the river line. It may be forced by a significant river obstacle and/or by a strong defending enemy.

Deliberate river crossings will not normally be conducted from march formations but will require a build-up of firepower and equipment on both entry and exit banks. Enemy forces must be cleared from the entry bank. Strong opposition on the exit bank dictates a deliberate crossing which provides for a phased build-up of combat power within the bridgehead. Further, deliberate crossings will be conducted when the water obstacle is severe and prohibits crossing with organic and expedient equipment.

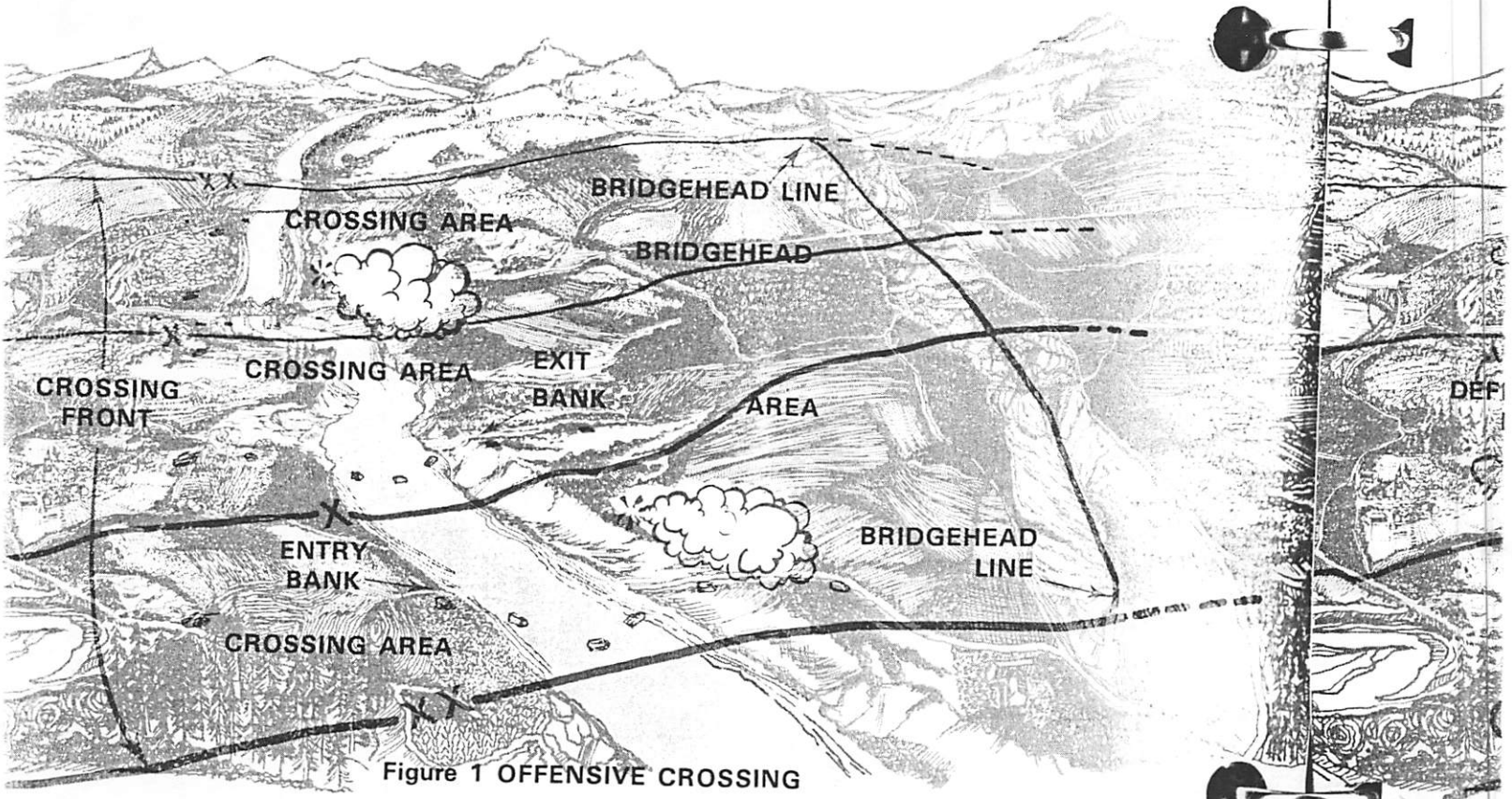


Figure 1 OFFENSIVE CROSSING

the entry bank.

crossing with organic equipment.

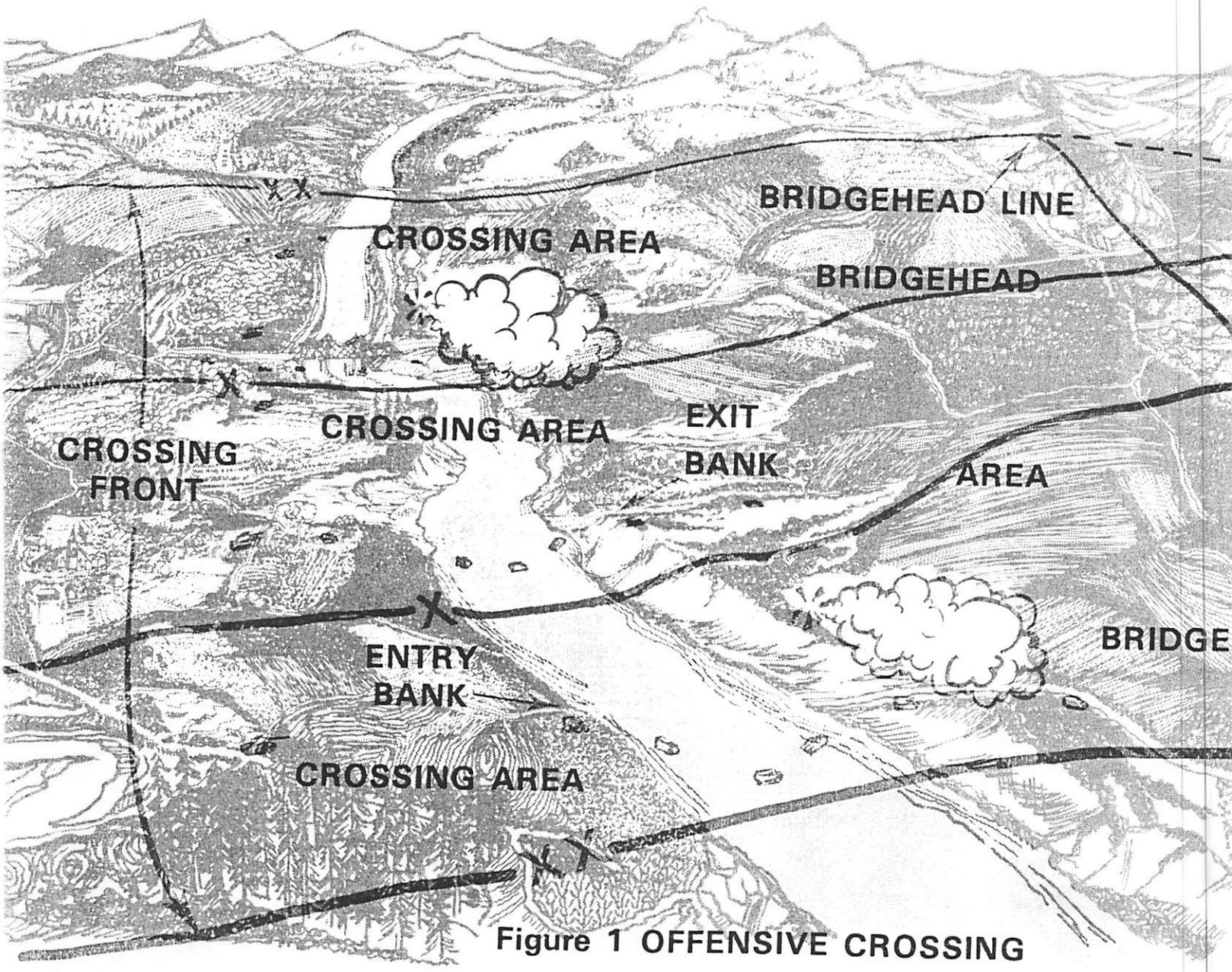


Figure 1 OFFENSIVE CROSSING

• **A retrograde river crossing** is applicable when enemy advances threaten to overwhelm the division, causing it to retrograde and subjecting it to an enemy pursuit. In this situation the retrograde crossing is conducted to:

• establish the defense on the exit bank or

• continue the retrograde to defensive positions beyond the water obstacle.

RETROGRADE RIVER CROSSINGS are characterized by:

- **Detailed planning and centralized control.**
- **Enemy control of maneuver initiative.**
- **High risk to friendly forces.**
- **Forces on exit bank providing overwatching fires.**
- **Forces delaying enemy's advances to trade space for time at the crossing sites.**

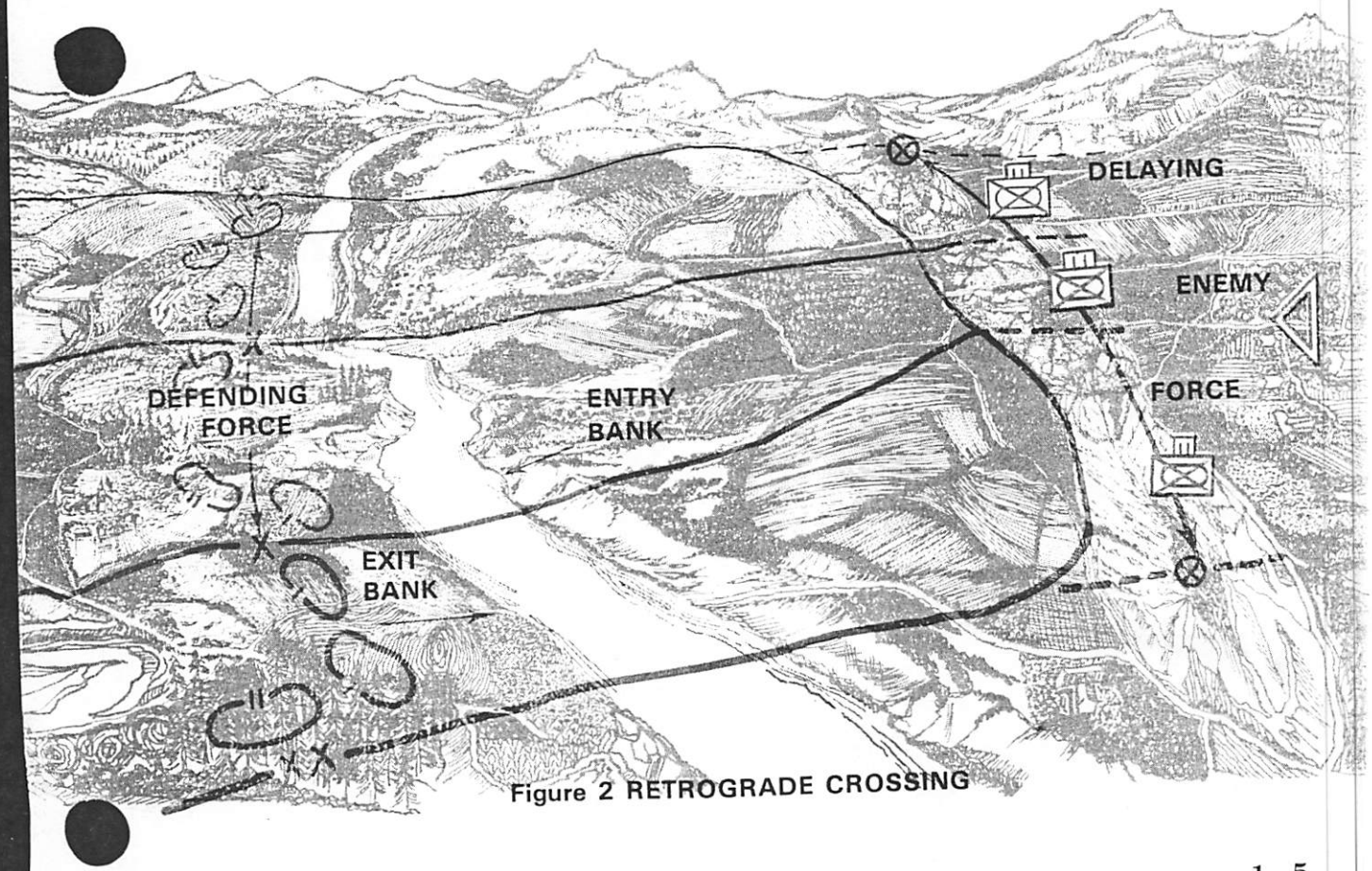
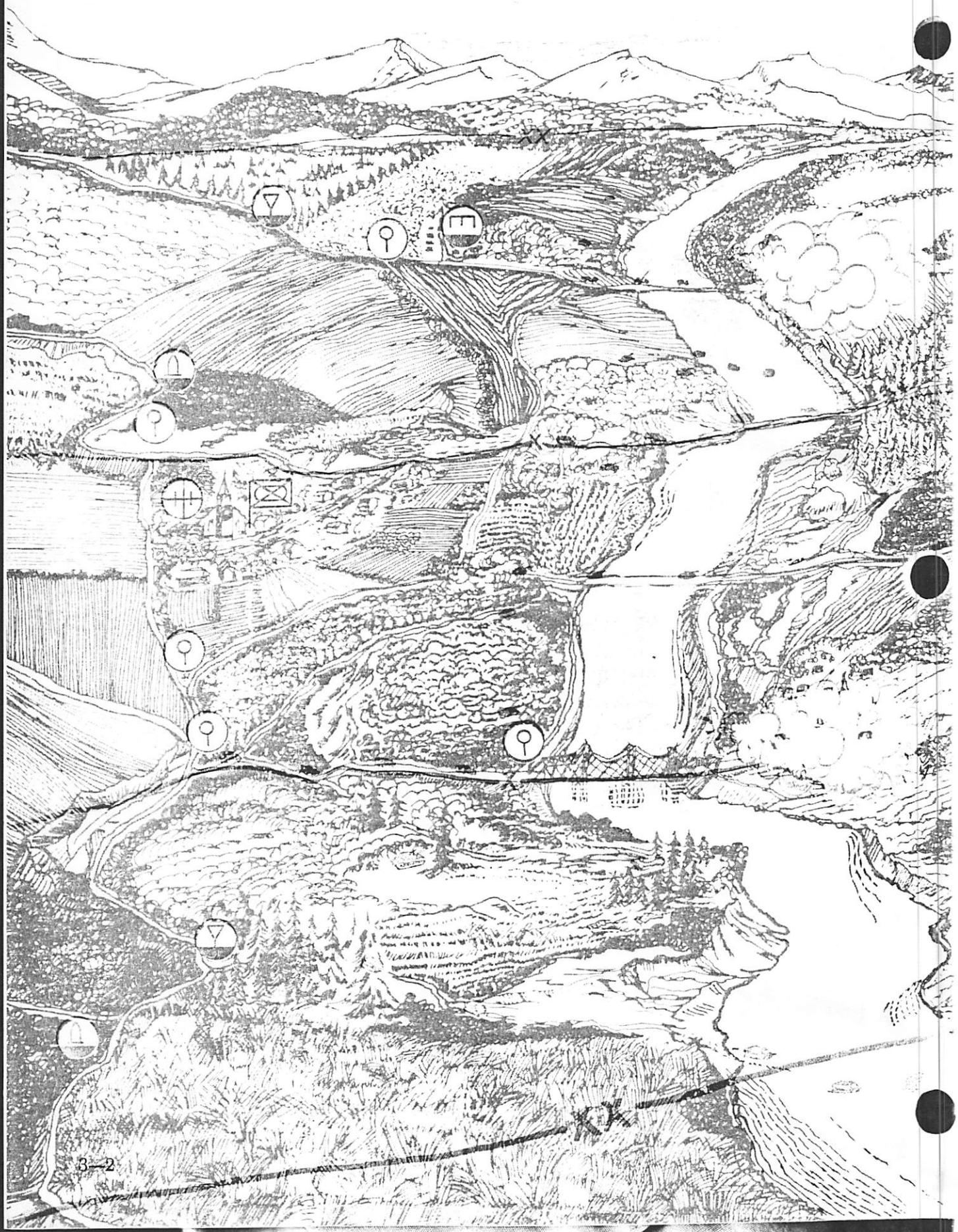


Figure 2 RETROGRADE CROSSING



REVERSE PLANNING

The crossing force commander facilitates planning by dividing the operation into distinct and manageable segments:

- Advance to the river.
- Assault crossing of the river.
- Advance from the exit bank.
- Securing the bridgehead.

These segments are distinct only while planning; during execution there is no planned pause between them since the overall operation proceeds as a continuation of the attack.

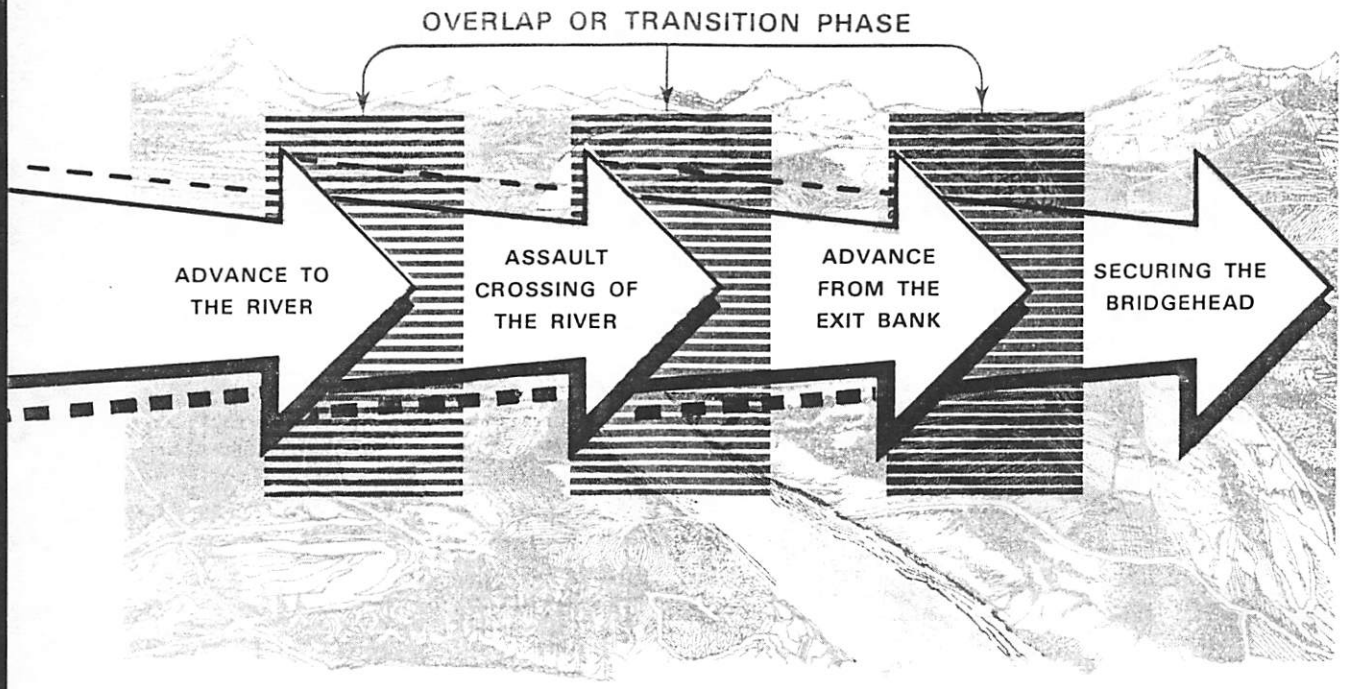
The planning sequence is considered in reverse order of occurrence (i.e., the last task of securing the bridgehead is examined first). However, the river is examined before the plans for securing the bridgehead and advancing from the exit bank are completed.

The crossing force and crossing area headquarters begin their planning using the commander's guidance. At the same time, the crossing force and crossing area engineers also begin their planning, as do the movement and traffic control planners. But as information and plans are assembled, they must be put together in reverse order and as shown in appendix D, River Crossing Planning Schematic.

The general planning requirements for river crossings vary little from routine offensive planning:

- Objectives are selected and assigned.
- Areas or zones for forces are determined.
- Control headquarters are designated, forces are allocated, and missions are assigned.

Assault crossing plans may be completed at crossing force headquarters level or delegated to the assault force and

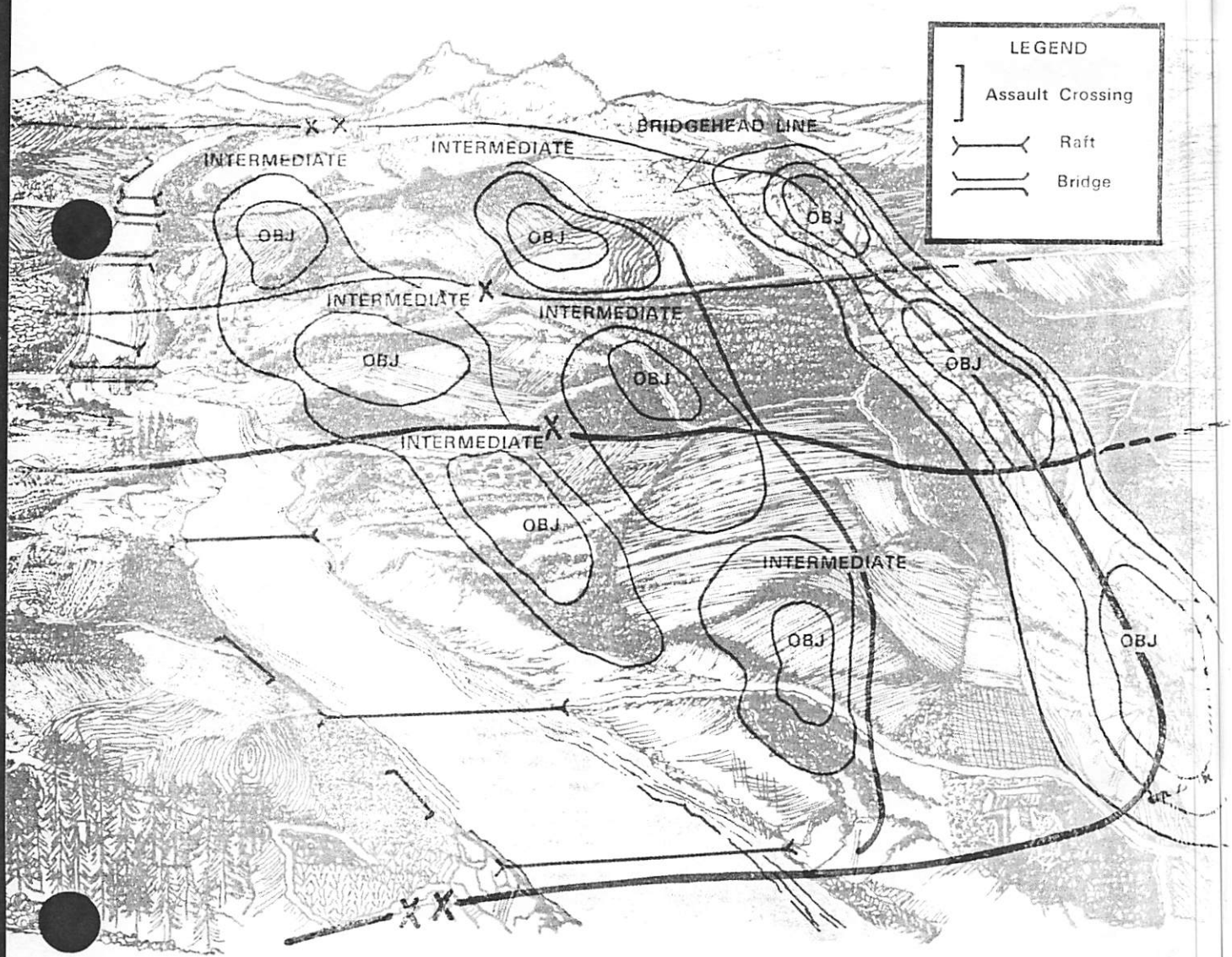


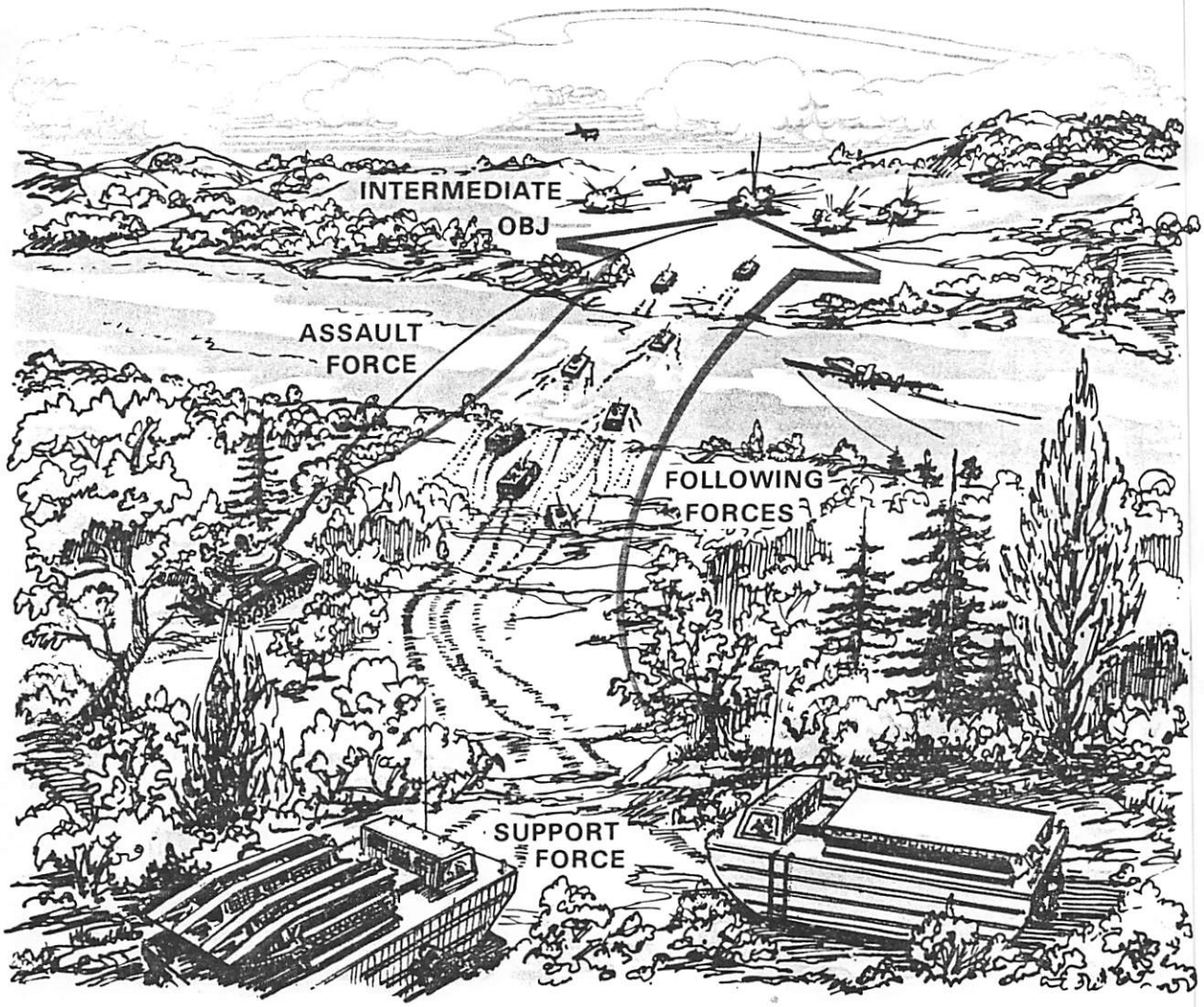
PLANNING SEGMENTS

Whenever possible, assault forces advance directly from the exit bank to bridgehead objectives. When intermediate objectives have been assigned, they are secured with minimum delay en route to final or bridgehead objectives. When intermediate objectives have not been specified by division or higher commands, the assault force commander selects objectives required to facilitate operations. At lower command levels (brigade) intermediate objectives are appropriate. For example, it is difficult for the lead battalion or company of an assault force to attack continuously without securing intermediate objectives, except when advancing against weak enemy forces.

Intermediate objectives serve several purposes:

- Orient the direction of attack toward final objectives.
- Provide centralized control of the advance.
- Facilitate changes in lead companies/battalions of the assault.
- Gain an initial foothold on the exit bank when stubborn enemy resistance is expected.





vides an umbrella for Army aviation operations in the crossing area. Engineers develop overwatching and firing positions, then advance with the follow-up forces to reduce obstacles, improve by-passes, and install flank obstacles as required. Necessary maneuver, fire support and air defense elements secure crossing sites from guerrillas or local enemy counterattackers.

Combat service support sustains the attack. Decentralized and "prepackaged" support accompanies the lead elements when possible. Rearming, refueling, and maintenance points are established along advance routes to speed up servicing. The service support center or headquarters keeps clear of enemy artillery, if possible, and crosses after the follow-up forces.

The crossing force commander also considers the employment of airborne and/or air assault forces to secure terrain objectives in the bridgehead. Planning of an airdrop or air landings parallels the guidance contained in appropriate airborne/air assault manuals. The ground forces crossing the river have the mission to link-up with such forces and/or secure the bridgehead. Rarely will the sole use of an aerial envelopment provide sufficient combat power to secure a bridgehead. Careful analysis of the terrain, enemy dispositions, and suitable air avenues of approach into the bridgehead may provide the commander with opportunities to employ airborne or air assault forces and Army aviation assets.

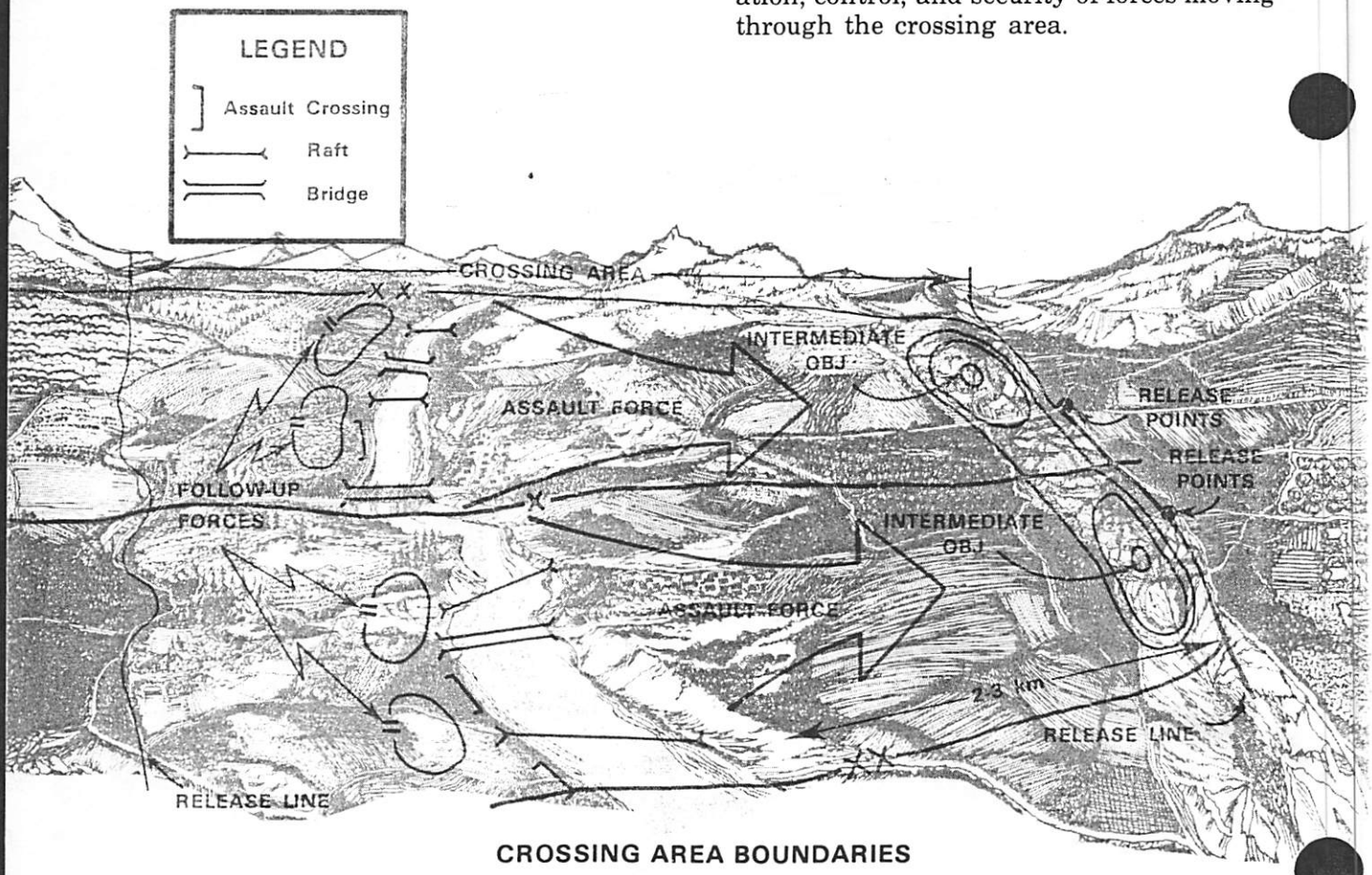
ADVANCE FROM THE EXIT BANK

Assault forces advance rapidly, without extensive reorganization, from crossing areas to objectives within the bridgehead. The enemy, given time, will attempt to halt the advance with strongpoint defenses, heavy artillery fires, and counterattacks. Therefore, comprehensive SOPs, detailed planning, and rapid execution enhance the probability of success.

RELEASE POINT/LINE

The advance from the exit bank extends from the release point/line to the bridgehead objectives. At the release point/line the crossing area commander relinquishes control of units to the assault force commander for continuation of the attack. The location of the release point/line is a function of terrain and expected battle *and* is mutually determined by the two commanders.

Release points/line may be located 2-3 km from the exit bank. This distance allows the assault force commanders to assemble their forces for continuation of the attack. Further, the clearance of this distance by follow-up and support forces, tank and artillery fire, under control of the crossing area commander, precludes direct fire on assault forces while they are still in the water. Release points (line when connected) are therefore located to facilitate the operation, control, and security of forces moving through the crossing area.



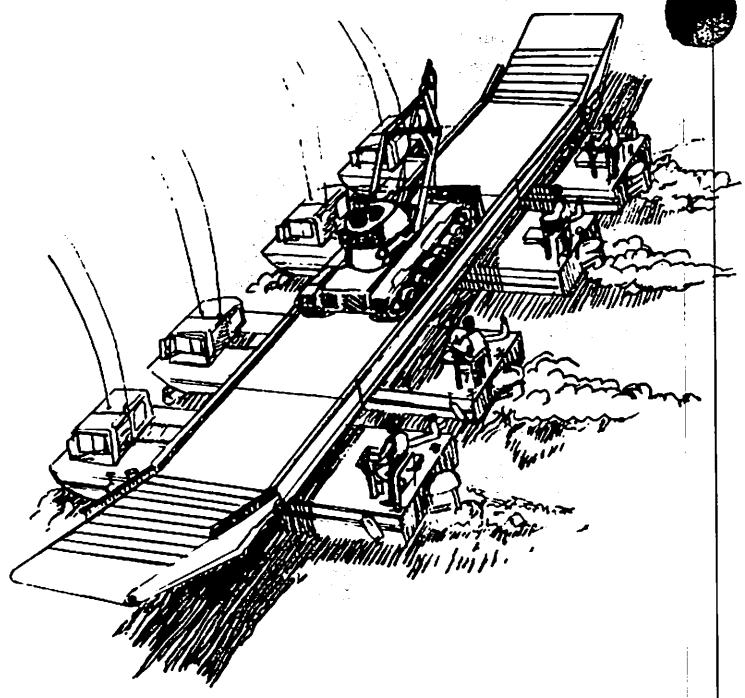
CROSSING AREA BOUNDARIES

Regardless of the crossing method, initial crossing elements are protected by overwatching forces. Elements waiting to be crossed provide supporting fires and/or deceptive demonstrations to enhance the success of initial crossings. Subsequent crossing sites in better locations may be developed and used when early enemy resistance has been overcome. Sites served by good road nets on either bank speed up the operation.

As soon as possible, consistent with the tactical plan, tanks and heavy engineer equipment cross. Rafting is the most common means; however, they may be able to cross by fording up to four feet of water at carefully selected sites. River beds at fording sites must be firm and free of large rocks and other obstructions.

Heavy engineer equipment, such as dozers, universal engineer tractors (UETs), and combat engineer vehicles (CEVs), cross early to prepare and improve exit points. This equipment augments engineer troops that crossed with the initial assault wave and are equipped with hand tools only.

Whereas initial assault/swimming sites are oriented on close-in exit bank objectives and surprise, subsequent sites are selected to provide good access and egress to enhance mobility and the build-up of combat power on the exit bank. To achieve a faster crossing rate, more control of vehicles/units moving into the crossing area and awaiting crossing is necessary. Units or "vehicle packages" are identified for crossing at specified sites *and* at specific times. The assault battalion or assault force commander works closely with the crossing area commander to develop such a vehicle crossing plan.



CROSSING METHODS AND MEANS

Before finalizing command and control arrangements, planners review the common crossing methods and means available.

As stated earlier the basic methods include:

- **Fording**
- **Assault Boats**
- **Swimming**
- **Rafting**
- **Bridging**

The following is an overview. Consult appendices B and C for additional characteristics and **FM 90—13—1** for operating safety and training procedures.

All military combat vehicles are capable of fording shallow rivers with limited stream velocity and stable beds. Most vehicles are equipped with kits to increase fording depth capabilities. Stream velocities of less than 1.5 meters per second are preferred. Specific depth capabilities and required adaptations are contained in appropriate operator TMs.

FORDING

- **Personnel wading**
- **Vehicle**

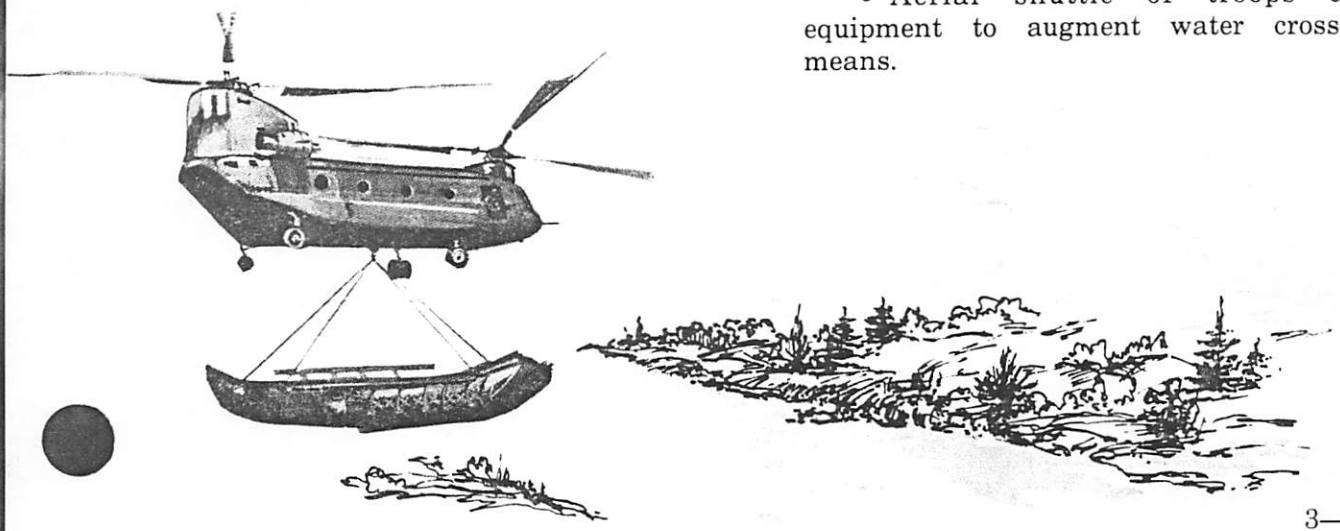
Each lead assault battalion should have at least one fording or assault/swimming site.

ASSAULT/SWIMMING

- Aircraft
- Reconnaissance and pneumatic assault boats
- Vehicle
  - Armored personnel carrier
  - 1 1/4 T cargo (GAMMA GOAT)
  - M548 cargo carrier
  - Sheridan (ARAAV)
  - Universal Engineer Tractor (UET)

Army aircraft provide a unique capability to cross and support crossing operations. They may be used to transport reconnaissance teams, exit bank security, and work elements; or they may comprise the primary means for crossing assault elements and equipment to secure objectives. Helicopters can lift components of some bridges that have been preassembled in rear areas and deliver them at the entry bank for launching or place them on the water surface. Other uses of aircraft include:

- Aerial fire support.
- Command and control.
- Aerial shuttle of troops and equipment to augment water crossing means.



Reconnaissance and pneumatic assault boats have a major role in the early stages of the assault. Site selection and exit bank patrolling may be accomplished by personnel operating from 3-man reconnaissance boats or 15-man pneumatic assault boats.

Assault boats:

- Are primary crossing means for infantry or other dismounted forces.
- Carry 12 assault troops and a 3-man engineer crew.
- Augment crossing capability of amphibious vehicles, or provide a substitute capability when the condition of entry/exit banks preclude vehicular use.
- Have slower rate of crossing and are more vulnerable to enemy fires when compared with armored personnel carriers.
- May be used for silent crossings, feints, and patrols.

Amphibious vehicles are the primary means for initial crossings by a heavy division. Armored personnel carriers are preferred for assault elements, while unarmored amphibious vehicles transport supplies and equipment. Entry and exit points must be cleared of obstructions and have slopes consistent with the vehicle's capability. Each amphibious vehicle must be prepared and inspected before entering the water. Stream velocities of less than 1.5 meters per second are preferred, and downstream drifting should be calculated for currents in excess of 0.8 meters per second.

Light rafting augments other means during crossing operations. The six light tactical raft (LTR) sets organic to the corps float bridge company can carry loads up to class 16 (class 12 with articulators). When all sets are connected, they form an 80-meter, class 16 bridge. The 24 raft pontoons with outboard motors can serve as assault boats.

Heavy rafting transports the division's class 60 loads. The three type rafts: Mobile Assault Bridge (MAB), Ribbon, and M4T6 are components of bridge sets and are assembled in various configurations to support given loads. Specific planning factors are contained in appendix B; however, a general guide follows:

RAFTING		RAFT CONSTRUCTION		
		CLASS	MANPOWER	TIME
LIGHT	LIGHT TACTICAL RAFT (LTR)	CL 12/16	ENGINEER PLATOON	20—30 MIN
HEAVY	MOBILE ASSAULT BRIDGE (MAB) RAFT	CL 60	MAB CREW	10—15 MIN
	RIBBON BRIDGE RAFT	CL 60	RIBBON CREW	15—20 MIN
	M4T6 RAFT	CL 60	ENGINEER PLATOON	3 HOURS
FERRY	CAPTURED CIVILIAN OR ENEMY RAFTING			

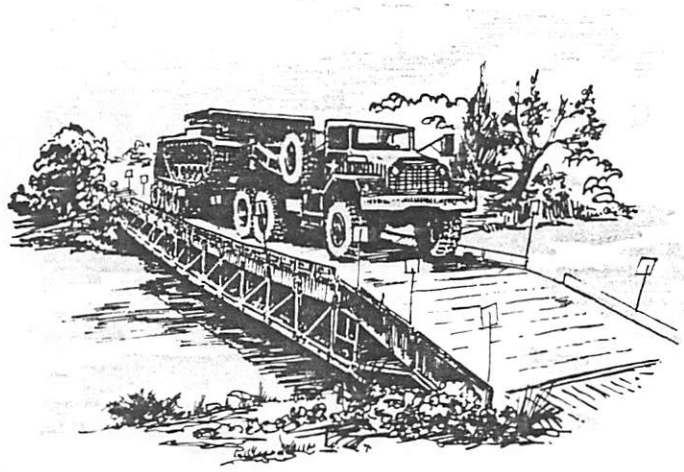
NOTE: For initial planning, each lead assault brigade should have two rafting sites. When tactical situation allows, one raft site can be converted or augmented to class 60 bridge site.

On wide unfordable rivers, rafts normally are the initial means for crossing tanks and heavy vehicles. Because of their size and mobility, rafts are less vulnerable than bridges to enemy fires. Crossings subject to enemy direct and observed fires require plans for dispersed rafting operations. Rafts alone cannot cross the required traffic volume. They are replaced or supplemented by bridging when enemy observed fires have been neutralized.

Because not all bridge types are in the current inventory, not all will be discussed. Research and development continues to improve the emplacement time and crossing capability. Unique combinations of existing bridge types and expedient resources may be found in appropriate engineer manuals.

The use of captured permanent bridges requires knowledge of the current condition and/or original construction Forces seizing permanent bridges require accompanying engineer elements to neutralize explosive devices and reinforce weak or damaged portions. Planners rarely base the success of a crossing operation upon seizure of a permanent bridge.

BRIDGING	
FIXED	BAILEY BRIDGE MEDIUM GIRDER BRIDGE
FLOATING	M4T6 MOBILE ASSAULT BRIDGE RIBBON BRIDGE
CAPTURED CIVILIAN OR TACTICAL BRIDGING	
NOTE: Each lead assault brigade should have one bridge site to supplement the other crossing methods and to sustain the crossing rates required to build-up combat power on the exit bank.	



Fixed bridging is seldom used during the initial assault because of required assembly times and magnitude of the effort. Fixed bridging is supported by the banks or abutments and is installed over ravines as well as rivers. This type bridging is basically panel construction and is assembled in an "erector set" manner. During river crossing operations, they normally supplement or replace AVLBs or float bridges.

Bailey Bridges may be built in various lengths, heights, and widths to accommodate the desired load. In a two-hour period the longest class 60 bridge that can be built spans 18 meters (60 ft) and requires

one engineer platoon plus the bridge platoon. If greater risks are acceptable, additional panels are added requiring an additional one-half hour to provide a 24 meter (80 feet) capability. Longer class 60 spans require more construction effort and time.

Medium Girder Bridges are newer bridges that provide a greater assault capability than the Bailey. The normal configuration provides a class 60 capacity for 30-meter gaps and requires an engineer platoon one hour to assemble. Spans of 49 meters are possible with the addition of a cable reinforcement kit or the British link reinforcing kit.

Floating bridges are the primary means of rapidly crossing assault vehicles and supplies during river crossing operations. The **M4T6** is an older version which requires combat engineer unit labor in addition to bridge company personnel to assemble. In relation to newer methods, it is slow to install, requires secure riverline assembly sites, and combat engineer labor. For example, a 150-meter bridge requires two engineer companies (5 platoons) four hours, working at five assembly sites simultaneously. On-site construction time may be reduced up to two hours by pre-assembly of floats in rear areas and transporting by truck or helicopter to the river for final assembly. In corps crossings, bridging requirements are extensive, and use of the fixed bridge is often required. The M4T6 also supplements or replaces other float bridging that is needed forward.

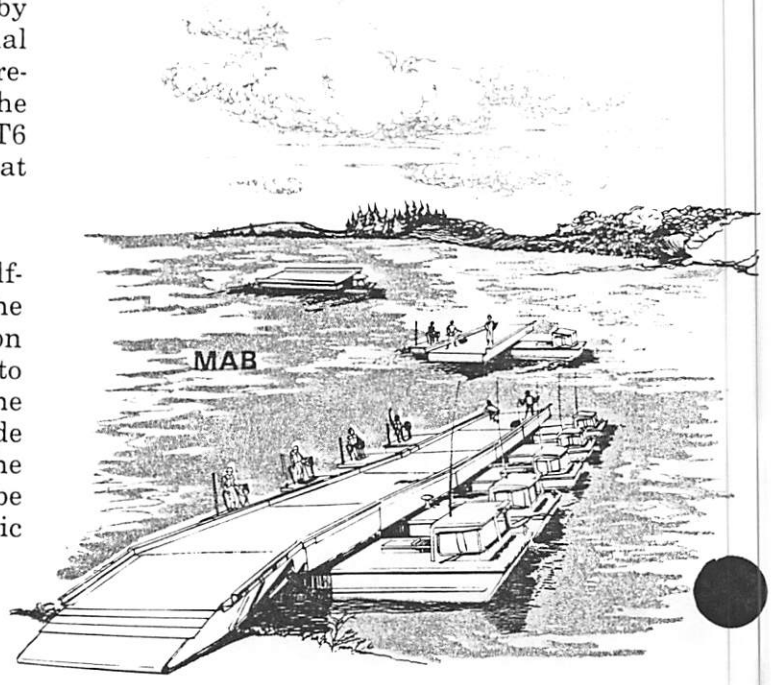
Mobile Assault Bridges (MAB) are self-contained, self-propelled units that enter the water from the march, lower a propulsion unit, rotate a roadway deck, and connect to other units to form rafts or bridges. Some units are equipped with decks that provide entry/exit ramps between the shore and the raft/bridge. A 150-meter bridge can be placed in operation in one hour by organic crews.

The **Ribbon bridge** consists of bays which are transported on 5-ton trucks. The bridge unit slides from the truck and unfolds into a floating roadway section upon entering the water. Power boats connect units into a raft or bridge. This bridge also has ramp units to connect the raft/bridge to shore. A 150-meter ribbon bridge may be assembled in one hour by organic crews.

The decision to install bridging requires careful consideration. The crossing force and area commanders must weigh the advantages of increased crossing rates versus the probability of losing a bridge to enemy activity. Available resources may be limited, permitting either rafting or bridging, but *not* both.

A simplified example of bridging and rafting comparisons follows:

A planning guide for bridge crossing is 200 vehicles per hour with 30 meters between vehicles. The river width or bridge length and stream velocity of up to 2.5 meters per second (8 fps) do not affect the crossing rate of class 60 vehicles. A 150-meter bridge of MAB or Ribbon requires organic crews one hour to assemble. This presumes the equipment to be on site and entry/exit banks prepared or ready at time bridge units are connected.



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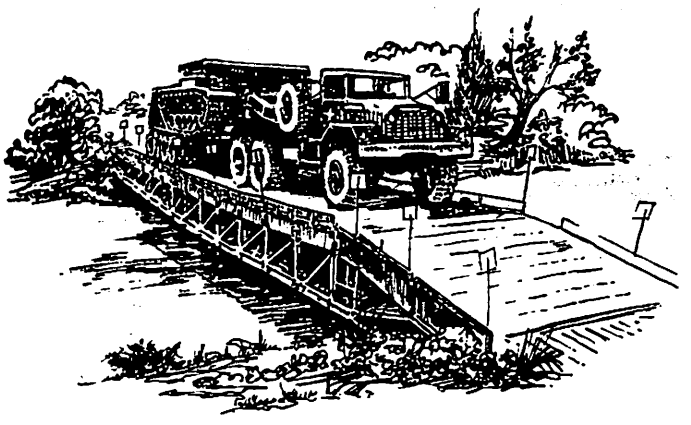
FIXED	BAILEY BRIDGE MEDIUM GIRDER BRIDGE
FLOATING	M4T6 MOBILE ASSAULT BRIDGE RIBBON BRIDGE
CAPTURED CIVILIAN OR TACTICAL BRIDGING	

NOTE: Each lead assault brigade should have one bridge site to supplement the other crossing methods and to sustain the crossing rates required to build-up combat power on the exit bank.



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To raft a similar river of 150 meters, the equivalent amount of bridging can be made, with additional ramp units, into four class 60 rafts. Each raft can carry the equivalent of one class 60 vehicle and make six round trips in one hour. This equates to 24 class 60 vehicles per hour for all rafts. Organic crews can construct these rafts simultaneously in 10-20 minutes.

This comparison does not address the tactical situation, the available crossing sites, or other available crossing means. It does show that bridges, once installed, can cross considerably more traffic in equal time periods.

General advantages of rafts and bridges are shown below:

RAFTS	BRIDGES
Faster to install.	Greater crossing rate.
Multiple sites, less vulnerable.	Centralizes assets.

Other advantages/disadvantages may be listed, but these conclusions remain:

- Construct only enough rafts to cross critical assault vehicles required to secure initial objectives, thus permitting acceptable risk of bridge emplacement.

- Bridging should commence as soon as possible, dependent on tactical situation and equipment availability.

When rafts and bridges operate in close proximity, position rafts downstream to preclude a disabled raft from drifting into the bridge and damaging/destroying either or both.

The bridge equipment mobility and rate of installation indicates the priority for type and means employed. In priority, construct MAB, then Ribbon, then M4T6. As previously noted, preassembly of the M4T6 floats in rear areas with truck or helicopter transportation to crossing sites significantly reduces the final assembly time on the river. The M4T6 should be considered a normal supplement. Its crossing rate is the same as the MAB or Ribbon, once installed, and is an effective means to augment or replace the MAB or Ribbon when they are required to move forward with attacking forces.

The MAB and Ribbon bridges may be readily disconnected and segments dispersed to camouflaged positions along the shoreline or relocated and reassembled at alternate sites. Because of possible dispersion and relocation requirements, bridge anchorage systems are not installed unless the bridge is to be in position for periods of four hours or more. The same is true if the water current is so severe that power boats/bridge unit propulsion is inadequate to hold the bridge in position. Anchorage systems require engineer effort and time to install *and* restrict the rapid dispersion of the bridge.

Planners keep in mind the added security needed to protect bridges. The enemy will attempt to destroy them. He may permit their installation and then attack them with the goal of destruction, rather than preventing their emplacement. The plan must provide protection by air defense, counterfires, and overwatching maneuver elements to thwart enemy attacks. If possible, alternate bridge sites are developed so that bridges can be relocated a few hundred meters up or down stream.

CROSSING AND MOVEMENT PLANS

The crossing plan provides for the movement of all elements of the crossing force during the crossing of the obstacle. It is developed in conjunction with other plans, especially those concerned with surface movement to and from the river, air movement, construction and maintenance of roads to and from the crossing sites, and the construction and operation of rafts and bridges (appendix G).

Specifically, the crossing plan provides for:

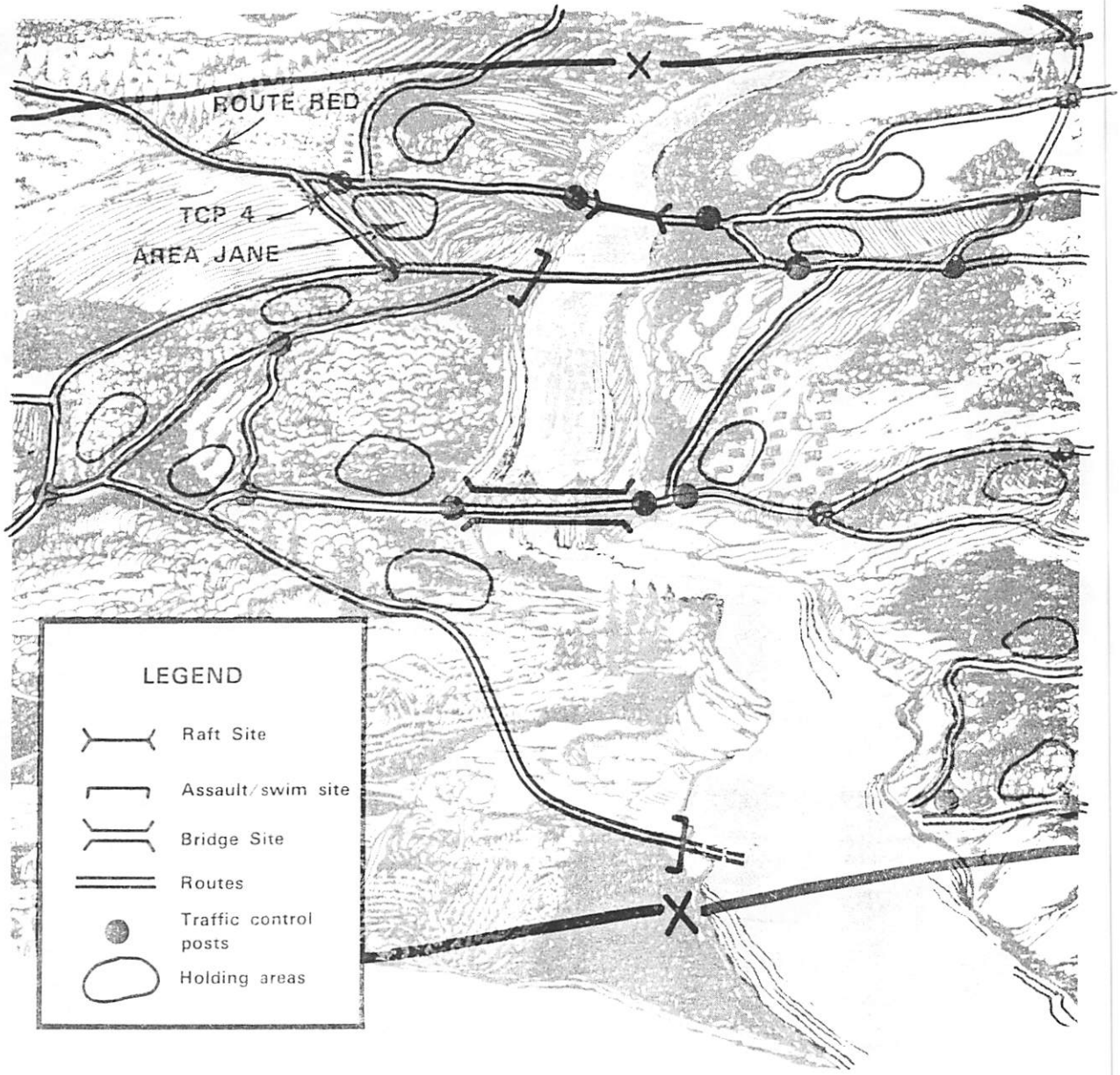
Crossing areas.	Delineating these areas.
Crossing sites.	Designating and allocating crossing sites and means to crossing elements.
Fording and amphibious vehicle crossing sites.	Designating and allocating their use to various units.
Rafts and bridges.	Designating the number, type, capacity, location, and time of opening rafts and bridges to be constructed.
Unit priorities.	Allocating unit priorities for use of the crossing sites and crossing means.
Crossing schedule.	Within priorities established, units establish a detailed crossing schedule specifying the number and type of vehicles.
Crossing area commanders.	To include designation of command and passage of control information.
Staging areas and engineer equipment parks.	Designation of these areas and parks as required.
Designation of alternating one-way traffic over bridges.	Established over the bridges only after movement to far bank is adequate to meet the needs of the assault forces.
Designation of one-way routes and the limiting of traffic to the area.	Establishing one-way routes and limiting types of traffic that are authorized to move to the area during the various phases of the river crossing operation.
Actions and responsibilities if traffic gets ambushed or interdicted by ground and/or airmobile forces.	Area commanders and convoy commanders must have specific guidance as to reactions and responsibilities if the convoy is ambushed or interdicted. Control of the reaction forces and the fire support must be delineated before the operation.

The **crossing schedule** provides a timetable for unit crossings at designated sites. The assault force (brigade) identifies the battalion crossing sequence; battalions specify the company crossing sequence. Requirements are matched with capabilities: crossing means and sites. Times for units/vehicles to arrive at designated sites are determined in relation to the initial assault (H-hour). For example, amphibians enter swim sites and tanks arrive at raft sites at specified intervals, rather than congregating on exposed banks and unnecessarily increasing their vulnerability.

SITE	METHOD	UNIT	VEHICLES	TIME
* * *	* * *	* * *	* * *	* * *
2	SWIM	B/1-77	11	H to H + 10 min
* * *	* * *	* * *	* * *	* * *
* * *	* * *	* * *	* * *	* * *
5	HEAVY RAFT	A/1-1	22	H + 30 min to H + 1 hr
* * *	* * *	* * *	* * *	* * *
* * *	* * *	* * *	* * *	* * *
7	HEAVY RAFT	B/1-1	17	H + 1 hr to H + 2 hr
* * *	* * *	* * *	* * *	* * *
3	SWIM	A/1-2	25	H + 10 min to H + 1 hr
* * *	* * *	* * *	* * *	* * *
			* * *	* * *

The crossing schedule must be flexible enough to accommodate changes in the battle, and unit crossing priorities may have to be adjusted. Designated areas and alternate routes are used, where necessary, to hold up units or bypass congested, deteriorating, and/or enemy-interdicted routes. The brigade or CAC staff may develop the crossing schedule. Preferably, sub-unit details are provided by the brigade; and the schedule is coordinated and consolidated by the CAC staff, subject to brigade commander approval.

A **movement plan** facilitates traffic control within the crossing area. Routes leading to crossings are specified and traffic control posts (TCPs) are designated at critical points and intersections. Staging and holding areas are selected to provide locations for units to assemble, prepare vehicles for crossing, and await movement to the crossing. Multiple areas, located in depth and adjacent to selected routes, provide for dispersion of crossing units. Covered and concealed areas are desired.

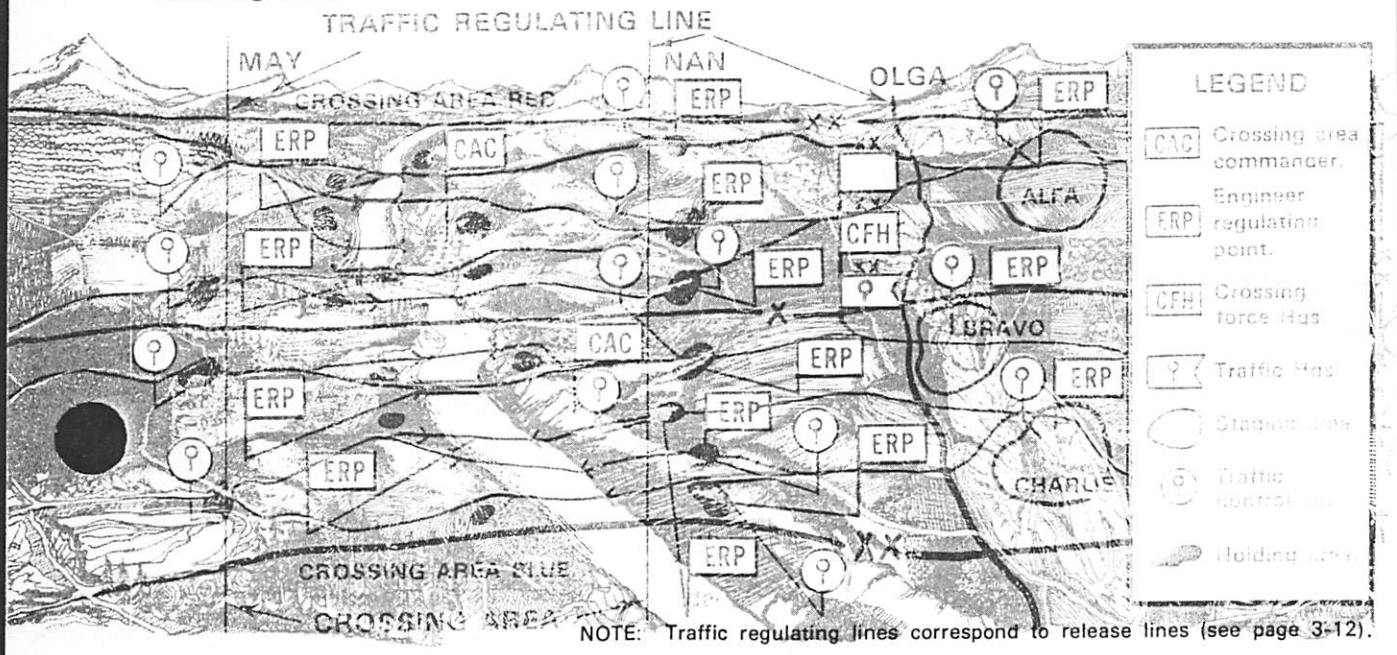


The CAC implements the crossing and movement plans through supporting and assaulting elements. The crossing area engineer maintains contact with sites for information on site development, crossing means installation, and traffic flow. He establishes regulating points, usually located with TCPs, to insure proper weight classification, preparation of vehicles before arrival at the crossing site, and rerouting where required. Military police operate TCPs, route traffic, and provide reports of the movement of units. *Movement control officers* are designated for each crossing battalion and separate unit. They are responsible for movement of their units in accordance with the crossing plan and maintain communications with the crossing area headquarters to receive information of changes. Changes may also be directly effected through the TCPs. The military police, operating in a common radio net, reroute traffic or direct units into assembly areas based on the flow of traffic along routes and into crossing sites. For further details, see "Control Measures."

TRANSFER OF CONTROL

As the assault forces advance to the river, in accordance with the crossing and movement plans and mutual agreement between the assault force and crossing area commanders, control is passed from the assault force commander to the crossing area commander. The decision as to when an assault force commander relinquishes control to the crossing area commander depends on the tactical situation within the crossing area.

Once crossing areas are established and transfer of control is made, the crossing area commander controls movement within the crossing area. As previously mentioned, the rear limit of the crossing area is approximately 2-3 km from the river. From this time on, regardless of scheduling, vehicles move into the crossing area only on call from the crossing area commander.



NOTE: Traffic regulating lines correspond to release lines (see page 3-12).

CONTROL MEASURES

Up to this point, planning, tactical and crossing operations, crossing and movement plans, and command and control organizations have been discussed. How can commanders maintain control and carry out plans to complete the river crossing operation successfully?

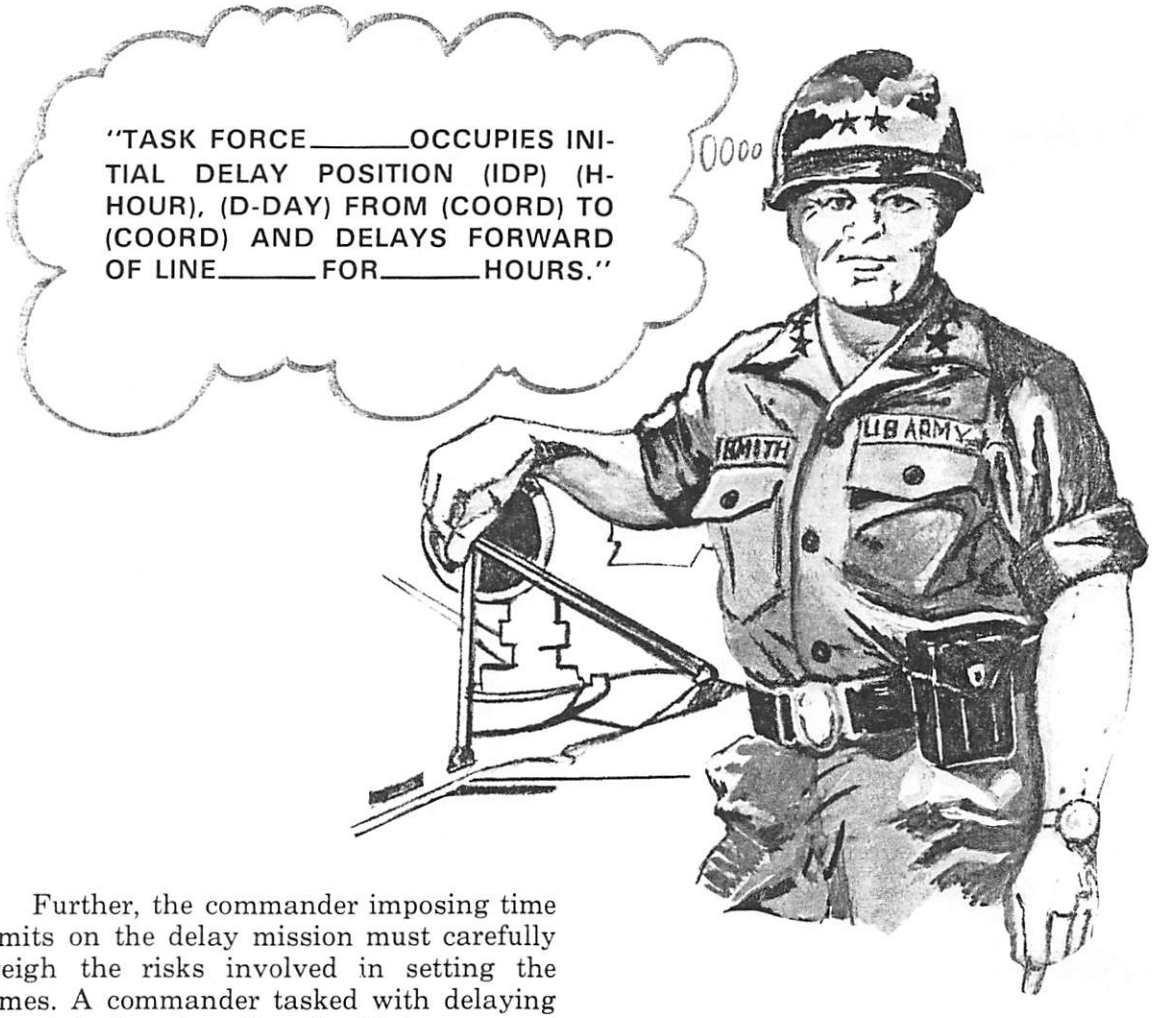
The following is a list of some of the techniques and control measures which should be used to carry out a river crossing operation:

- Effective command relationship.
- Detailed and efficient planning.
- Clear and manageable plans and orders.
- Up-to-date unit SOPs.
- Adequate security forces.
- Responsive fire support and air defense.
- Proficient units, crews and operators.
- Serviceable and effective communications equipment and nets.

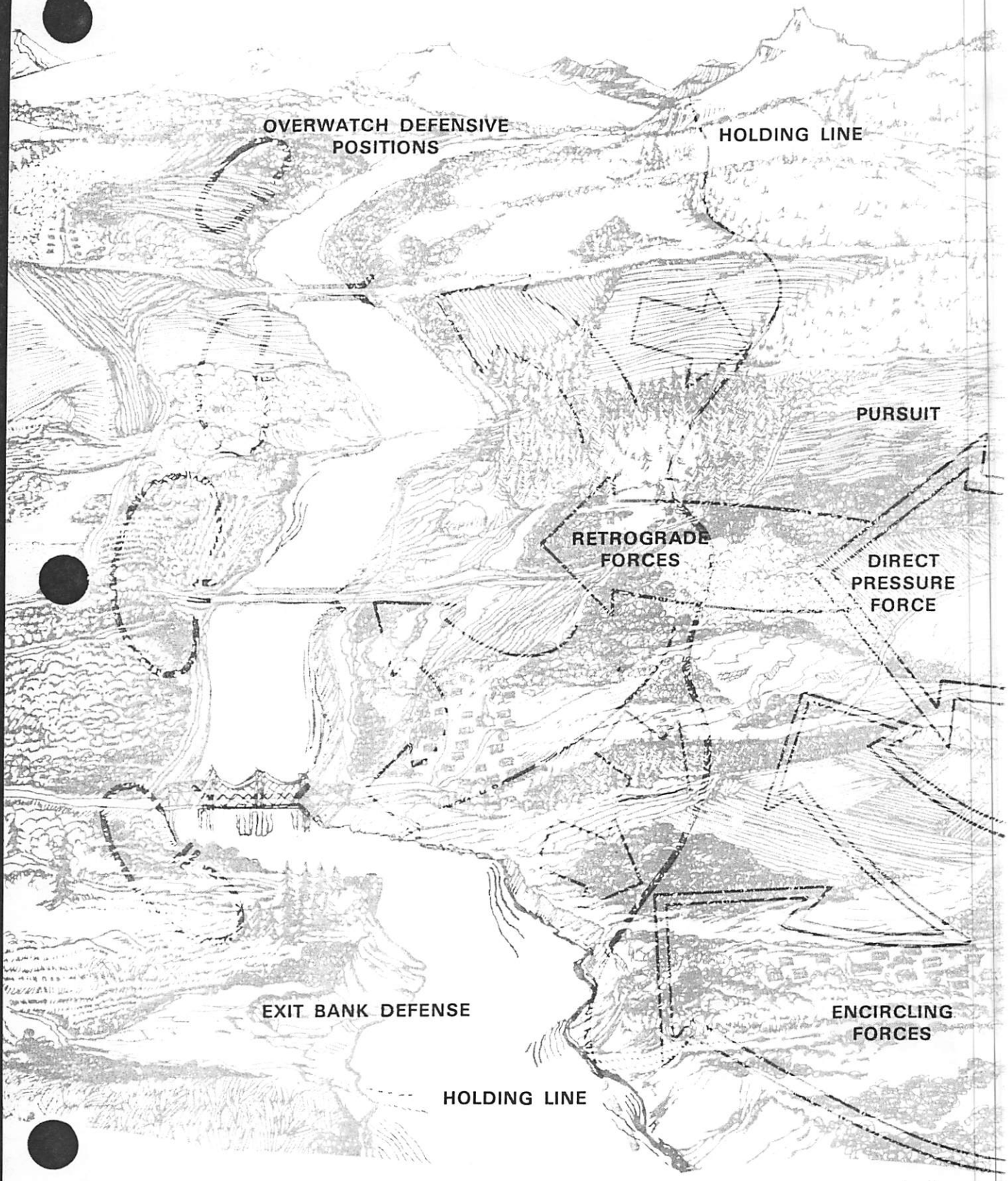
Normally, a delay mission is an economy of force operation; so, the force may expect to fight outnumbered. If the force cannot successfully defend in place, it must trade space for time. Nonetheless, a commander assigned a delay mission should not assume that his force will always be defending or withdrawing.

Indeed, the advantages of surprising the enemy, seizing the initiative, and generating uncertainties in the minds of enemy commanders may well indicate the desirability of attacking. The enemy generally is impeded most when his losses are high; so, the delaying force seeks by whatever means possible to inflict maximum casualties on the enemy.

For larger forces (brigades and divisions) a delay mission is usually a time and/or terrain-limited series of defensive actions. A delay operation denies the enemy access to a specified area for a specified time, inflicting on him the maximum possible casualties that can be expected, given the strength of the delay force. Thus, a covering force might be ordered to fight the enemy forward of a specified place (perhaps the holding line) for a specified time (perhaps 72 hours).

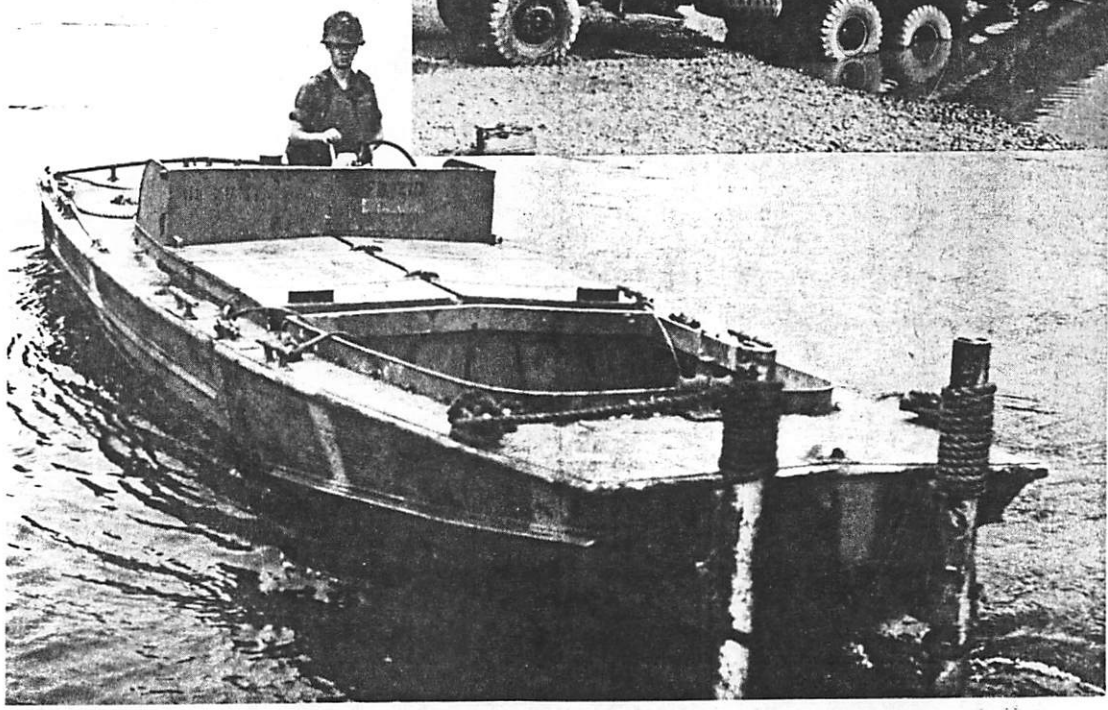


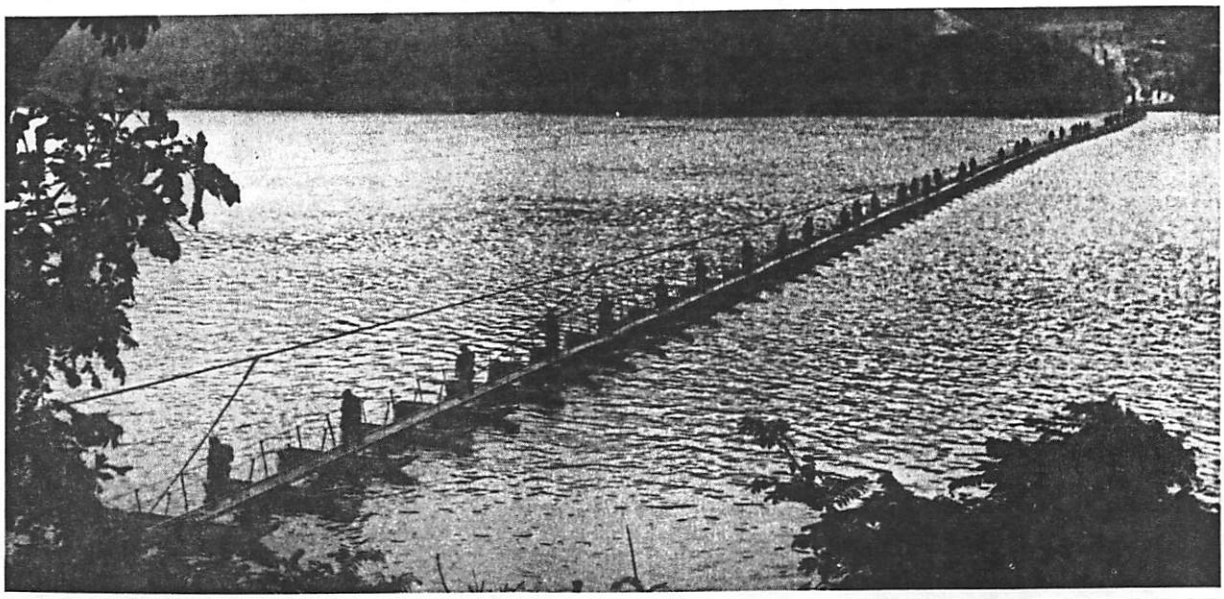
Further, the commander imposing time limits on the delay mission must carefully weigh the risks involved in setting the times. A commander tasked with delaying forward of a river line for 24 hours must deploy sufficient force to have a reasonable chance of carrying out his task.


OVERWATCH DEFENSIVE POSITIONS
HOLDING LINE
PURSUIT
RETROGRADE FORCES
DIRECT PRESSURE FORCE
EXIT BANK DEFENSE
ENCIRCLING FORCES
HOLDING LINE

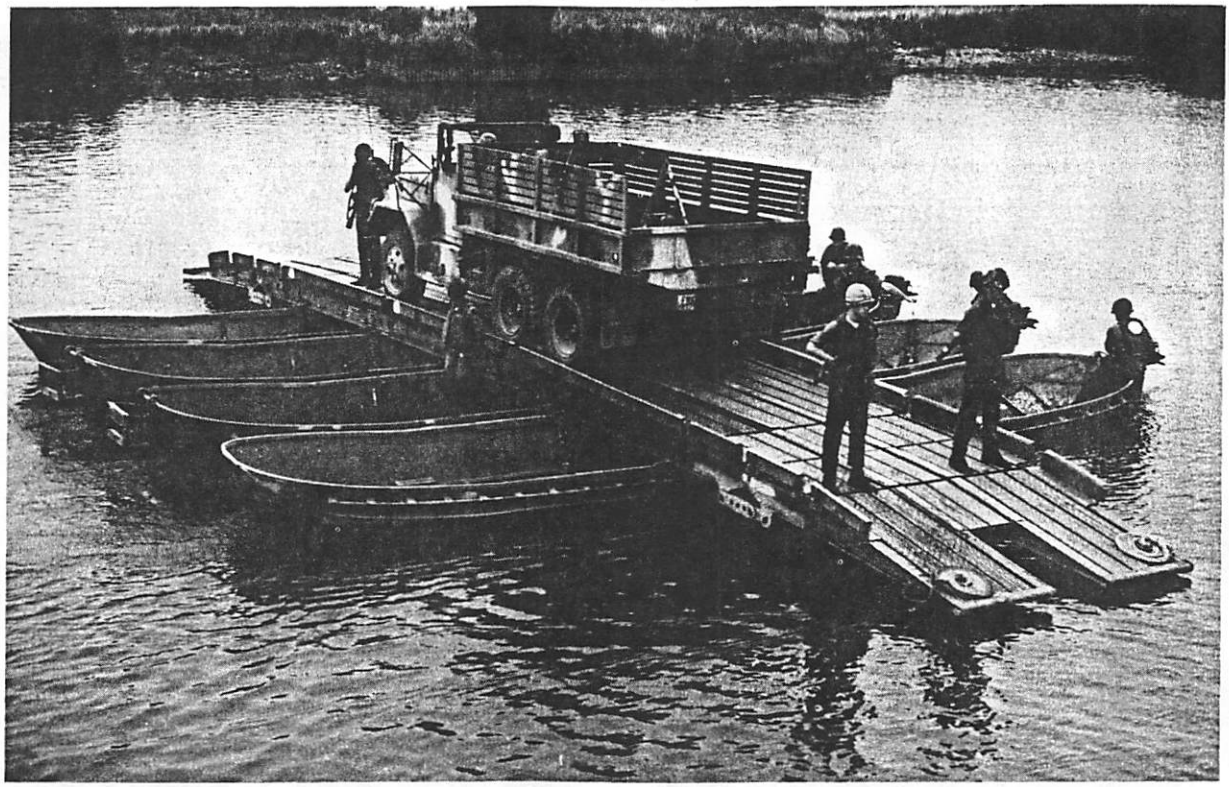
Launching

BRIDGE ERECTION BOAT (27 FT)

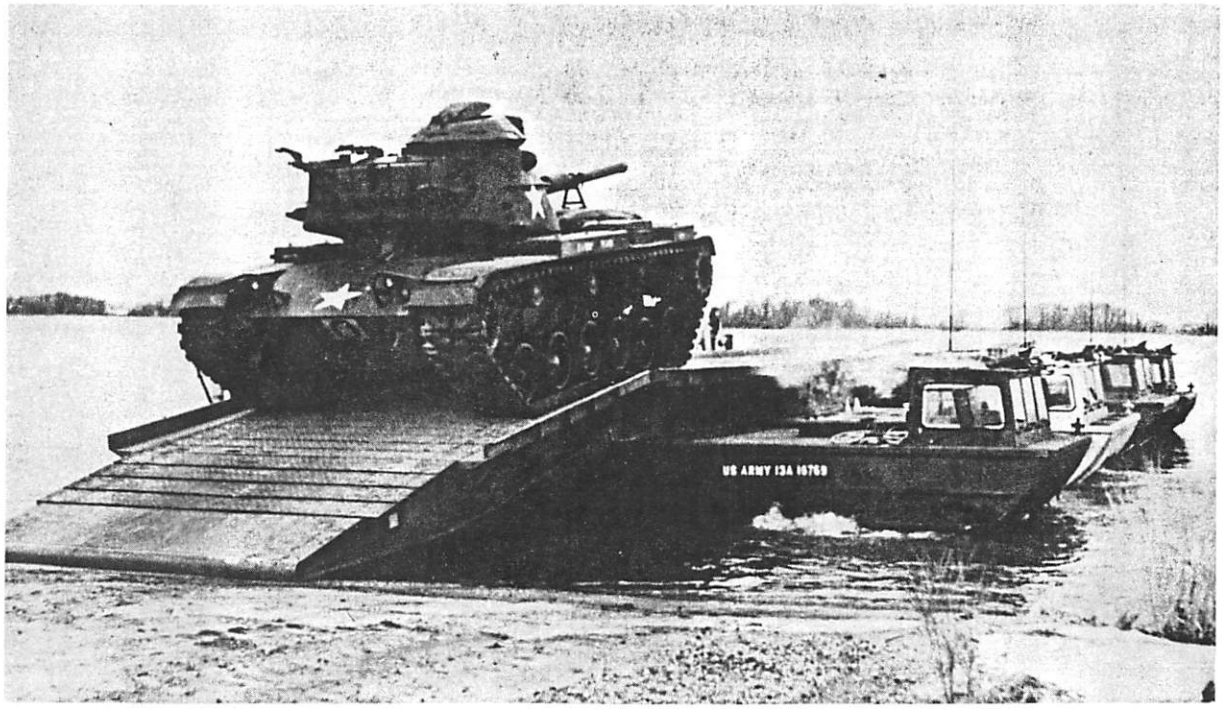




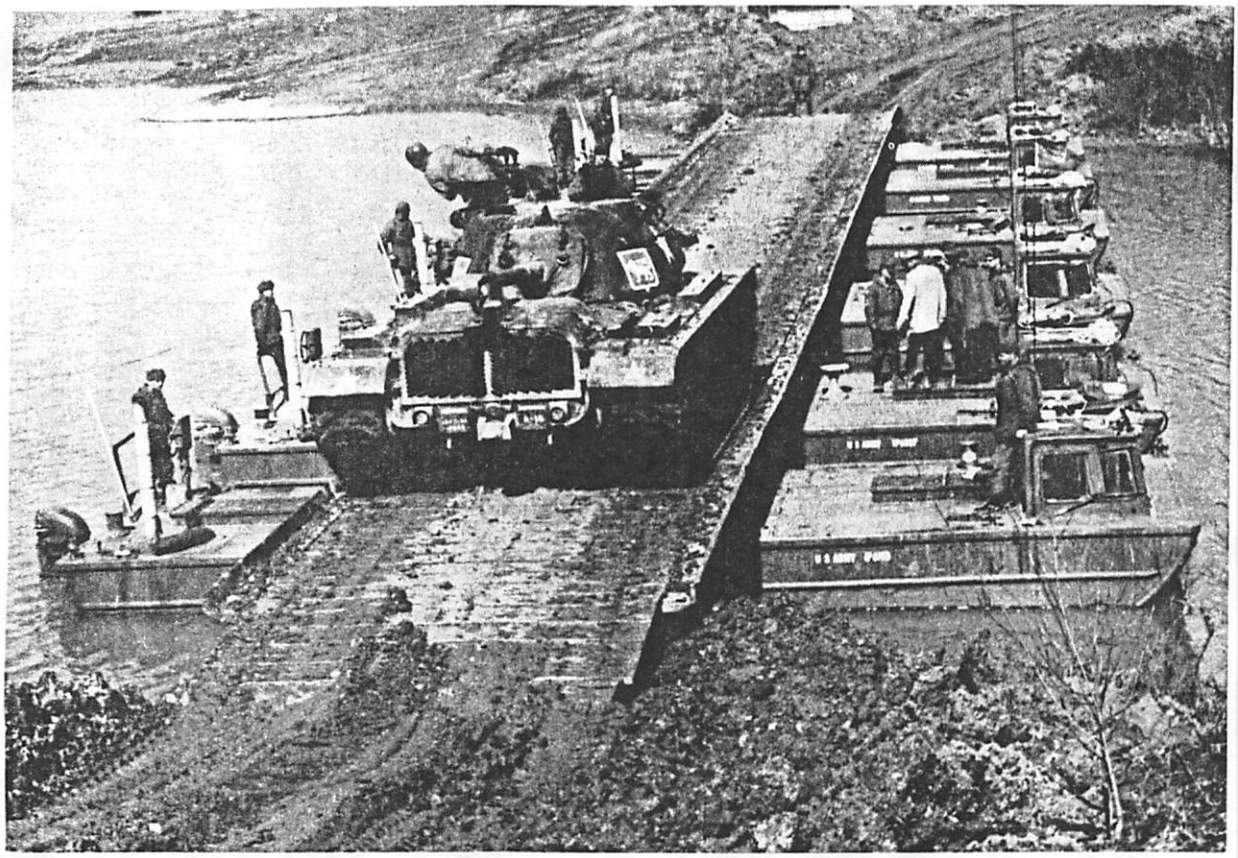
ALUMINUM FOOTBRIDGE



LIGHT TACTICAL RAFT (LTR)

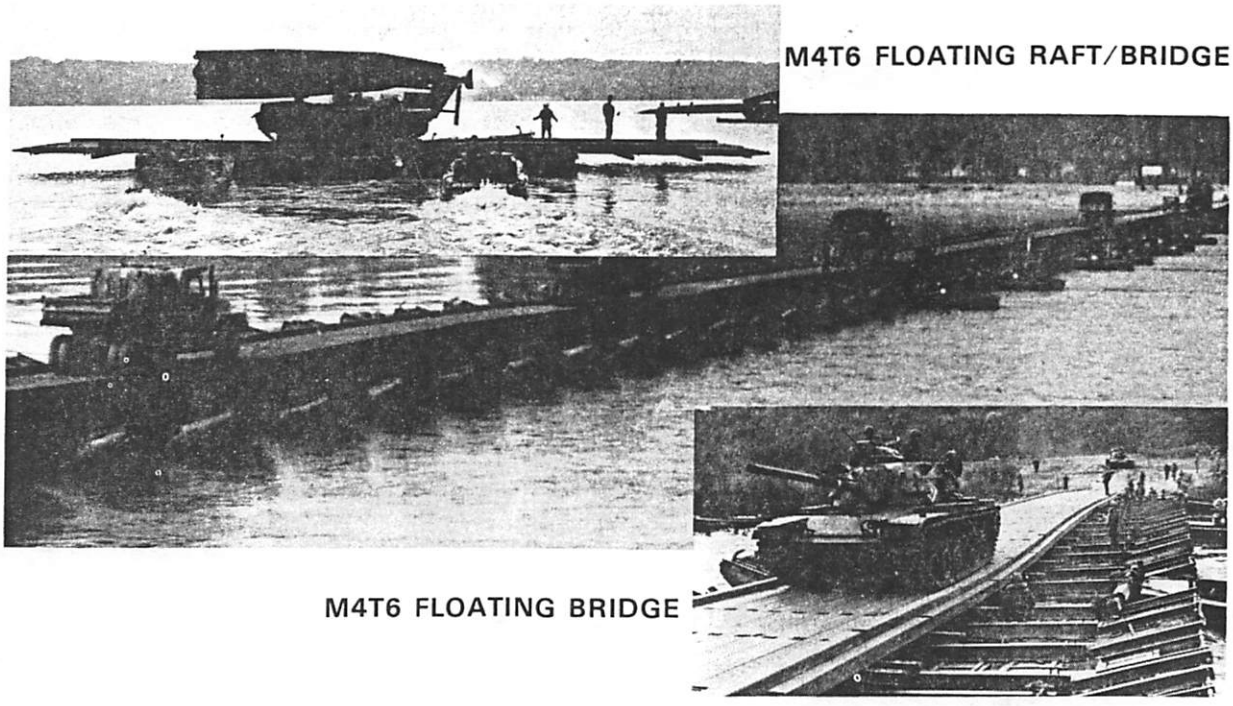


MOBILE ASSAULT RAFT

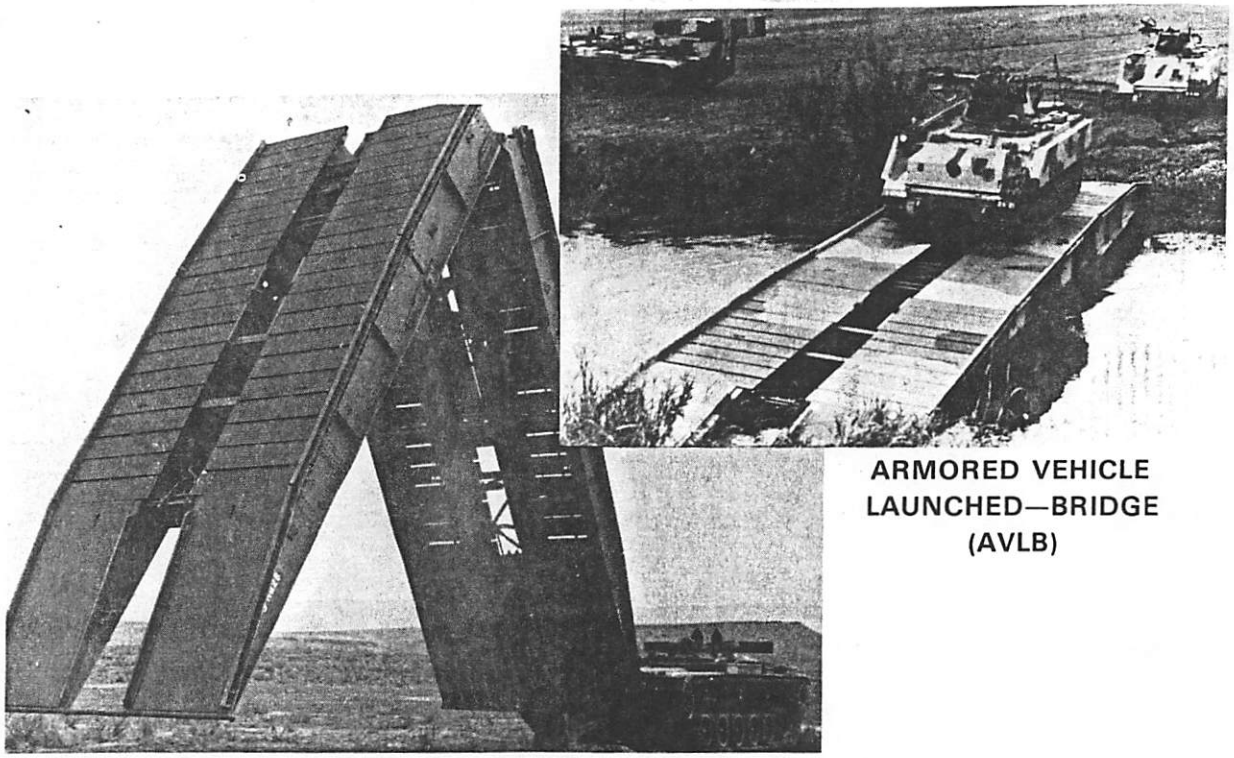


MOBILE ASSAULT BRIDGE (MAB)

M4T6 FLOATING RAFT/BRIDGE



M4T6 FLOATING BRIDGE



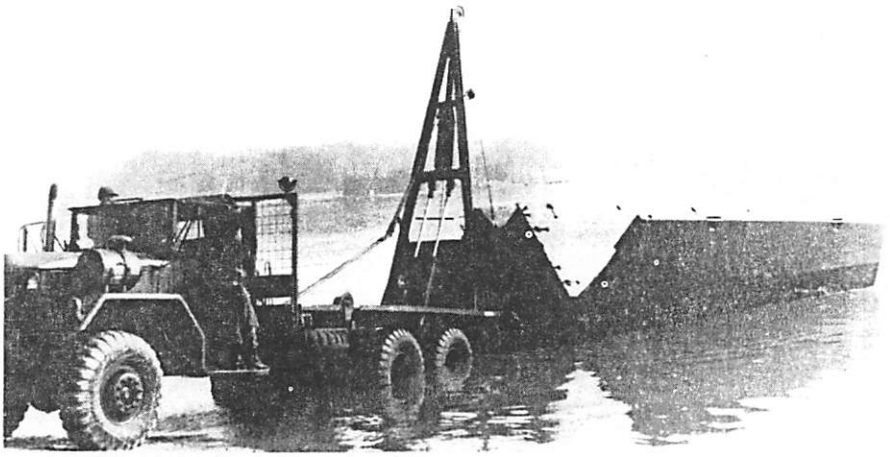
ARMORED VEHICLE LAUNCHED—BRIDGE (AVLB)

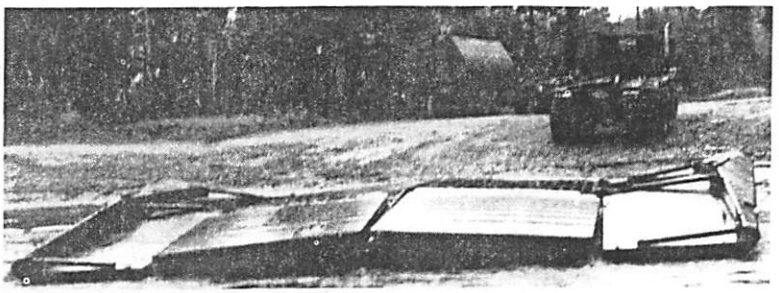
Moving

Launching

Unfolding

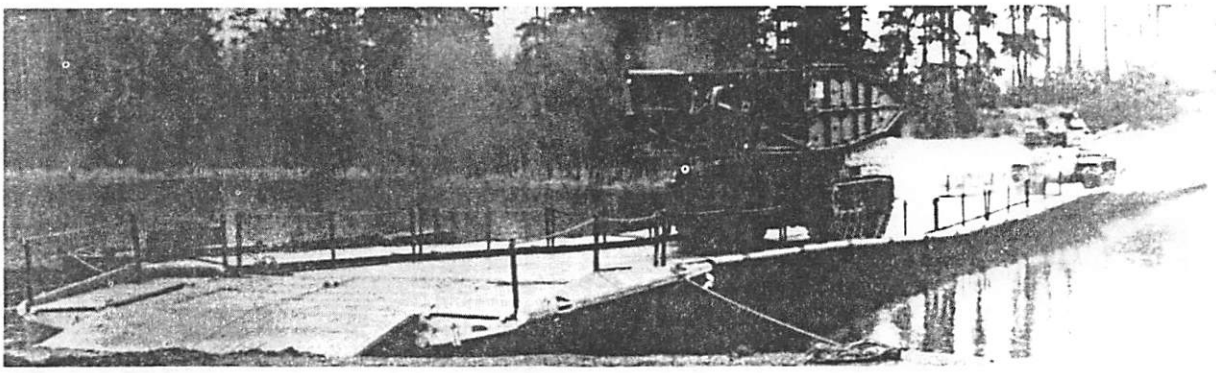
Retrieving

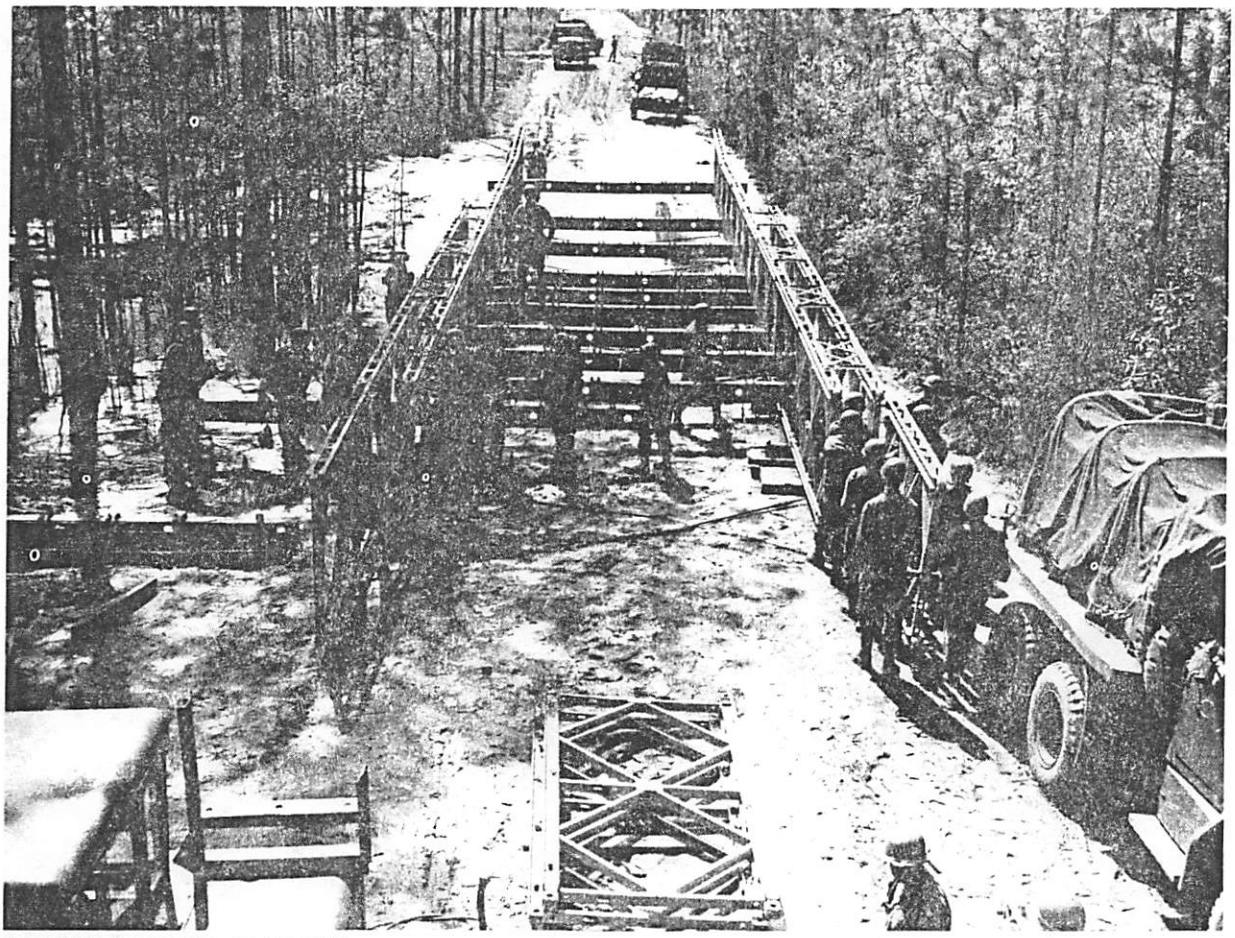




Open

RIBBON RAFT/BRIDGE





PANEL BRIDGE (BAILEY)

MEDIUM GIRDER BRIDGE (MGB)